IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Patent Application of:

Edward T. Grochowski et al.

Application No.: Unknown

Filed: June 18, 2001

Title: METHOD AND APPARATUS FOR PERFORMING PREDICATE PREDICTION

Examiner: G. Patel

Art Unit: 2183

Box Patent Application
Assistant Commissioner of Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

In response to the office action mailed February 14, 2001, for the above-referenced patent application, it is respectfully requested that the application be amended as follows and that the following remarks be considered:

IN THE SPECIFICATION

On page 2, line 4, add –This is a divisional of Application No. 09,224,406, filed December 31, 1998.--

IN THE CLAIMS

Please cancel claims 13, 14, 18, and 19.

A marked-up version of the claims, showing changes made, may be found in Appendix A, attached hereto. Below is a clean set of all pending claims, submitted under 37 C.F.R. §1.121(c)(3), incorporating any additions, cancellations, and amendments thereto. Please substitute these claims for pending claims of the same number.

1. A method of executing a sequence of instructions comprising:

determining a predicted predicate value for a predicate;

and

conditionally executing a predicated instruction depending on the predicted predicate value.

2. (Once Amended) The method of claim 1, further comprising:

executing an instruction to compare two values to determine an actual predicate value for the predicate;

comparing the actual predicate value to the predicted predicate value; and

flushing a pipeline if the predicted predicate value and the actual predicate value are unequal.

3. The method of claim 2, further comprising executing the predicated instruction after flushing the pipeline.

4. The method of claim 2, wherein flushing the pipeline consists of flushing only a backend portion of the pipeline.

5. The method of claim 2, further comprising updating historical information using the actual predicate value corresponding to the predicate in a predicate table.

6. The method of claim 1, further comprising storing the predicted predicate value in a file after determining the predicted predicate value and before conditionally executing the predicated instruction.

7. The method of claim 1, wherein determining the predicted predicate value includes calculating the predicted predicate value using historical information corresponding to the predicate.

8. (Once Amended) The method of claim 7, wherein determining the predicted predicate value includes reading the historical information corresponding to the predicate in a predicate table.

9. The method of claim 1, wherein conditionally executing the predicated instruction includes executing the predicated instruction if the predicted predicate value is true.

10. The method of claim 1, wherein conditionally executing the predicated instruction includes treating the predicated instruction like a no-op if the predicted predicate value is false.

11. A processor comprising:

a predicate table; and

a predicate prediction calculator having an input coupled to an output of the predicate table.

12. The processor of claim 11, further comprising a speculative predicate register file having an input coupled to an output of the calculator.

15. A processor comprising:

a predicate table to store historical information corresponding to a predicate; and

a pipeline coupled to the table, the pipeline to receive a predicted predicate value calculated from the historical information, and to conditionally execute a predicated instruction depending on the predicted predicate value.

16. The processor of claim 15, further comprising a predicate prediction calculator to calculate the predicted predicate value.

17. The processor of claim 15, further comprising a speculative predicate register file to store the predicted predicate value.

20. The processor of claim 15, wherein the predicate table is to further store historical information corresponding to a plurality of predicates.

IN THE ABSTRACT

A marked-up version of the abstract, showing changes made, may be found in Appendix A, attached hereto. Following is a clean replacement abstract, incorporating any additions and deletions. Please delete the abstract, and replace with:

In one method, a predicted predicate value for a predicate is determined. A predicated instruction is then conditionally executed depending on the predicted predicate value. For example, in accordance with one embodiment of the present invention, a predicate table stores historical information corresponding to a predicate. A pipeline coupled to the table receives a predicted predicate value calculated from the historical information. The pipeline may use this predicted predicate value to conditionally execute a predicated instruction. The actual predicate value is provided back to the predicate table from the pipeline.

REMARKS

Claims 1-20 were submitted for examination. Claims 1-12, 15-17 and 20 have been rejected. Claims 13, 14, 18 and 19 have been objected to. Applicants have amended claims 2 and 8, and canceled claims 13, 14, 18, and 19. Reconsideration and reexamination of the above-referenced patent application, as amended, is respectfully requested.

Rejection Under 35 USC §102 Over Christie

Claims 1-3, and, presumably, claims 6, 9, and 10, have been rejected under 35 U.S.C. §102 as being anticipated by Christie, U.S. Patent No. 6,009,512 ("Christie").

Applicants respectfully submit that the combination of Christie with Yeh fails to teach or suggest Applicants' invention as claimed, including, for example, Applicants' claimed limitation of "determining a *predicted* predicate value for a predicate" (emphasis added) as set forth in claim 1.

Christie proposes conventional uses of a predicate value. Applicants respectfully submit that Christie contains no teaching or suggestion of *predicting* a predicate value. Moreover, Christie contains no teaching or suggestion of using a *predicted* predicate value in the conditional execution of a predicated instruction. The predicate values discussed throughout Christie are not predicted values, they are nonspeculative, actual values.

Therefore, Applicants respectfully submit that Christie does not teach or suggest Applicants' invention as set forth in independent claim 1, upon which claims 2-10 are dependent.

Rejection Under 35 USC §103 Over Christie

Claim 4 has been rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,009,512 of Christie ("Christie"). Applicants respectfully submit that, as stated above, Christie contains no teaching or suggestion of using a *predicted* predicate value in the conditional execution of a predicated instruction. Therefore, Applicants respectfully submit that Christie does not teach or suggest Applicants' invention as set forth in independent claim 1, upon which claim 4 dependent.

Rejection Under 35 USC §103 Over Christie and Yeh

Claims 5, 7-8, 11-12, 15-17 and 20 have been rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,009,512 of Christie ("Christie") in view of U.S. Patent No. 5,903,750 of Yeh et al. ("Yeh").

Applicants respectfully submit that the combination of Christie and Yeh fails to teach or suggest Applicants' invention as claimed, including, for example, Applicants' claimed limitation of "conditionally executing a predicated instruction depending on the predicted predicate value" as set forth in claim 1.

As stated above, Christie contains no teaching or suggestion of a *predicted* predicate value. Although Yeh uses the term "predicate prediction," it is clear that "predicate prediction" disclosed in Yeh is not the same "predicate prediction" that is the subject of Applicants' present invention. The "predicate prediction value" of Yeh refers to bundled branch instructions, and the value indicates whether or not the branch instruction is to be speculatively "Taken" or "Not Taken." See, e.g., col. 7., lines 12-38. This is not the same as predicate prediction as presently claimed. For example, the presently claimed method sets forth "conditionally *executing* a predicated instruction depending on the predicted predicate value."

The combination of Christie with Yeh fails to remedy the individual deficiencies of each reference because neither of these references provides any teaching or suggestion of predicate prediction as presently claimed.

Therefore, Applicants respectfully submit that there is no combination of Christie and Yeh that teaches or suggests Applicants' invention as set forth in claim 1, upon which claims 2-10 are dependent. In addition, note that independent claims 11 and 15, upon which all remaining claims are dependent, set forth similar limitations.

Claims Objected To

Claims 13-14 and 18-19 have been objected to as being dependent upon a rejected base claim. Applicants respectfully submit that these claims have been cancelled in the present case and pursued separately in a parent case.

Conclusion

Claim amendments, other than those specifically discussed above, were made to broaden and improve the readability of the claims. The purpose of these voluntary amendments is unrelated to patentability.

In view of the amendments and remarks set forth above, Applicants respectfully submit that the objections and the rejections of the claims submitted for examination have been overcome, and that the now pending claims are in condition for allowance.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: June 18, 2001

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APPENDIX A

VERSION OF SPECIFICATION AND CLAIMS
WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Claims 13, 14, 18, and 19 are cancelled, so no marked-up version is shown for these claims.

2. (Once Amended) The method of claim 1, further comprising:

executing [a COMPARE instruction] an instruction to compare two values to determine an actual predicate value for the predicate;

comparing the actual predicate value to the predicted predicate value; and

flushing a pipeline if the predicted predicate value and the actual predicate value are unequal.

8. (Once Amended) The method of claim [6] 7, wherein determining the predicted predicate value includes reading the historical information corresponding to the predicate in a predicate table.

IN THE ABSTRACT

In the abstract, please enter the following amendment:

In one method, a predicted predicate value for a predicate is determined. A predicated instruction is then conditionally executed depending on the predicted predicate value. For example, in accordance with one embodiment of the present invention, a predicate table stores historical information corresponding to a predicate.

A pipeline coupled to the table receives a predicted predicate value calculated from the historical information. The pipeline may use this predicted predicate value to conditionally execute a predicated instruction. The actual predicate value is output back to the predicate table from the pipeline.